Alaska Department of Fish and Game
Division of Wildlife Conservation
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Physiological Ecology of Moose: Nutritional Requirements for Reproduction with Respect to Body Condition Thresholds

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Research Performance Report
1 July 1999–30 June 2000
Federal Aid in Wildlife Restoration
Grant W-27-3, Study 1.52

This is a progress report on continuing research. Information may be refined at a later date.

FEDERAL AID
ANNUAL RESEARCH PERFORMANCE REPORT

PROJECT TITLE: Physiological Ecology of Moose: Nutritional Requirements for Reproduction with Respect to Body Condition Thresholds

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COOPERATORS: Kenai National Wildlife Refuge

GRANT AND SEGMENT NR.: W-27-3

PROJECT NR.: 1.52

SEGMENT PERIOD: 1 July 1999–30 June 2000

WORK LOCATION: Kenai National Wildlife Refuge, Soldotna

STATE: Alaska

I. PROGRESS ON PROJECT OBJECTIVES

OBJECTIVE 1: Determine overwinter nutritional requirements for reproductive success in female moose.
We formulated multiple rations to simulate natural diets with varying levels of energy and protein. Using a controlled access feeding system, we applied nutritional treatments to cow moose and quantified changes in body composition throughout the year.

OBJECTIVE 2: Determine thresholds in body condition at which reproductive performance declines.
Using ultrasonography, we diagnosed pregnancy status and calf viability in cow moose exposed to various nutritional treatments.

OBJECTIVE 3: Evaluate the existence of cumulative effects in female moose relative to body condition, reproductive performance, and nutrition.
Using a repeated measures design, we quantified moose body condition, litter sizes, and calf mass as well as metabolizable energy intake.

OBJECTIVE 4: Refine estimation of moose body composition using ultrasonography.
We continued to refine ultrasonographic measures of fat and muscle thickness for quantifying energy and protein reserves. In addition, a new cutaneous palpation scoring method shows promise for quantifying body fat in very lean animals.

OBJECTIVE 5: Using ultrasonography and a quantitative serum assay, develop and refine methodology for diagnosing twinning in moose.
Two manuscripts have been published: 1)Isolation, purification, and characterization of pregnancy-specific protein B from elk and moose placenta. 2)A serum pregnancy test with a specific radioimmunoassay for moose and elk pregnancy-specific protein B.

OBJECTIVE 6: Evaluate effects of density dependence on body condition, reproductive performance, and diet quality of moose on natural browse.
Captive and free-ranging moose were examined to quantify the role of habitat quality and animal density on nutritional condition.

II. SUMMARY OF WORK COMPLETED ON JOBS IDENTIFIED IN ANNUAL PLAN THIS PERIOD

JOB 1: Conduct feeding trials to evaluate the relationship between moose nutrition, body condition, and reproductive performance. We continued to quantify body condition and in utero fetal rates of cows on various nutritional treatments.

JOB 2: Evaluate relationship between calf health and the dam's nutrition and body condition.
To date, 2 related manuscripts have been produced that are in press: 1)Vitamin E, selenium, and reproductive losses in Alaskan moose. 2)Nitrogen and carbon isotope fractionation between mothers, neonates, and nursing offspring.

JOB 3: Validate approaches for determining body fat and body protein in live moose.
Carcasses and live moose were used in the evaluation of ultasonography and a cutaneous palpation scoring method for improving estimates of body fat in lean animals.

JOB 5: Monitor Density Effects on Body Condition and Reproductive Performance.
Pens at the Moose Research Center containing forage densities representing early and late successional forest were stocked with low densities of moose. We quantified changes in body condition overwinter in response to differing levels of forage availability. Diet quality and plant architecture were quantified by directly observing foraging behavior of habituated cow moose. Frequent GPS locations were obtained to determine the effects of forage density on animal movements and activity.
Free-ranging moose in numerous populations across the state of Alaska were handled during collaborative projects. We examined body condition in relation to lactation status, in utero fetal numbers, habitat quality, and winter severity.

III. ADDITIONAL FEDERAL AID-FUNDED WORK NOT DESCRIBED ABOVE THAT WAS ACCOMPLISHED ON THIS PROJECT DURING THIS SEGMENT PERIOD

none

IV. FEDERAL AID TOTAL PROJECT COSTS FOR THIS SEGMENT PERIOD

$ 93,700

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